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An investigation of factors available for each applicant to determine which are suitable criteria for student selection, and an analysis of the relationship between success in nursing school and later success on State Board examinations.

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AN INVESTIGATION OF FACTORS PERTINENT TO SUCCESS IN NURSING

(A Study Conducted by the Bureau of Institutional Research for the Nursing School

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Purpose of Study

The primary purpose of the Nursing School is to prepare students for careers in the field of Nursing. In view of the fact that the State Board Nursing Examination is considered the measure of proficiency for entering into such work, such training can be considered to be preparatory for taking the State Board examination.

As a result of the preceding, along with the lack of evidence leading to the selection of suitable criteria for the selection of Nursing school students, the purpose of this study is twofold:

1) To investigate those factors available for each student applying for admission to the Nursing School in order to determine which of these factors could serve as suitable criterion for the selection of students.

2) To investigate the relationship between success in Nursing School and latter success on the State Board examination, under the assumption that a poor relationship in such a case would indicate either invalid state board examinations or improper selection of curricula in the Nursing School.

Data Available for Analysis

A record was kept for students in the Nur ing School* for all years from 1933 through 1945, and including the following information for each student:

High school rank (in %age grade - not rank)
Intelligence Quotient
Pre-P grade — Basic Sciences
1st year average grade — Clinical Sciences
2nd year average grade
3rd year average grade
Overall 4 year average
State Board Examination grade

Only those students for which all of this information was included, were kept in the data for the analysis, with the total number of students for which all

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data was available being 256.

Limitations of the Study

The major limitations of the study include the following:

1) Since the state board examinations are changed each year without sufficient evidence of equivalence from one year to the next, the state board examinations for students from one year to another may not be comparable---even though the assumption of equivalence was assumed in this study.

2) The grades assigned to students for 1st, 2nd, 3rd, and 4th year studies were assigned by a large number of different instructors, who may have different standards for grading, consequently making grades for the different years non-comparable. Grades were assumed to be accurate for this study.

3) Intelligence test results were based upon several different tests and consequently may not be completely comparable over the number of years included.

4) High school ranks assigned to the students were based upon comparisons with different groups of high school students for each candidate. If there were significant differences in the calibre of students in the various high schools supplying the Nursing School students, these ranks may not be comparable from student to student.

5) The statistical measure used for determination of relationships involved is difficult to interpret, and is affected by extreme differences in the variability of the measures. That is, the correlation between the state board and the Intelligence Tests results as compared with that between state board and 4 year average might give misleading conclusions if the measure of variability were not considered. The former would be larger than the latter through the difference in variability even if the same intrinsic relationship was involved in each case.

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Office of Education

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These limitations must be taken into accoutn inthe interpretation of the results given later in the study.

Part I — Investigation of Factors pertinent to Selection of Students.

Since the only data available for applicants for admission to the Nursing School was the high school rank and the intelligence quotient, this phase of the study involved computing coefficients of correlation between these two factors and both the 4 year average in Nursing School and the State Board Grade. Results from the coefficients of correlation computed are as follows:

1. Relation between H.S.R. and 4 year average was .496
2. Relation between Intelligence Q. and 4 year average was .693
3. Multiple correlation between 4 year average and H.S.R. and Intelligence Quotient combined (i.e., utilizing both H.S.R. and I.Q. to predict the 4 year average) was .740
4. Relation between H.S.R. and State Board Exam was .670
5. Relation between I.Q. and State Board Exam was .22
6. Multiple correlation between the H.S.R. and I.Q. combined, and State Board Examination was .676

From these results some interesting points can be noted. First, it appears that the high school rank is far superior to the I.Q. insofar as predicting success on the State Board examination is concerned (.67 to .22); however, the picture reverses when the 4 year average in Nursing School is considered, where the I.Q. is superior to the H.S.R. (.693 to .496). This is possible in view of the relatively low relationship between 4 year average and State Board Examination. Second, it can be noted that whether the 4 year average or the State Board is used, the combination of I.Q. and H.S.R. appears to be superior to the use of either one. In the case of the 4 year average, this multiple correlation is .740 and in the case of the State Board Examination it is .676 (*note that in the case of the State Board the multiple correlation is only slightly different than the correlation by H.S.R. alone, whereas in the case of the 4 year average the combination is considerably improved).

A further investigation of these relationships leads to some tentative conclusions concerning possible cutoff scores for selection of students. A two-way frequency distribution of high school rank and I.Q. with State Board shows, first, that every single individual with a High School average of 90 or above made at least a grade of 80.5 on the State Board, with the average State Board grade being 86.8. This was independent of what the intelligence quotient was. This is contrasted to the fact that the highest State Board Exam grade made by a student with a high school average (independent of the I.Q. result) was 77.5. This would appear to indicate that if the high school average is 90 or above the chances of success in nursing are high regardless of what the I.Q. is, and if the high school average is below 80, the chances of success are small regardless of the I.Q. result. It would appear feasible to select students falling into one of these two categories without considering the intelligence quotient — i.e., if the H.S.R. is above 90 the student would be an excellent prospect, whereas if he were below 80 he would appear to have a poor chance for success.

For those falling in the 80-84 interval on high school average, the average state board exam for those with I.Q. less than 110 was 77.2 with 63% of the individuals making less than an 80 on the state board; while the average state board exam for those with I.Q.s of 110 or more is 81.4 with 60% of them making state board grade of 80 or more. For those falling in the 85-89 interval on high school grades, the average state board grade for those with I.Q.s of 90 or above is 85.0, with 78% of such grades being 80 or more.

From these results, the following selection standards would appear feasible:

1) If the High School average is 90 or above, the applicant should be accepted, since the average for all such students in the past on the state board was 86.8 and every single one made above 80. In this case, the I.Q. would not be used.

2) If the High School average is between 85-89, the applicant would be accepted if the I.Q. was 90 or more---since the average state board for such students in the past was 85.0, with 78% of such students making state board grades above 80.

3) If the High School average is between 80-84, the applicant would be accepted only if the I.Q. was 110 or more---since students falling in this high school range making I.Q. of more than 110 had an average state board of 81.4 with 60% above 80, whereas students in this high school range making an I.Q. of less than 110 had an average state board of 77.2 with 63% of them making less than 80.

4) If the high school average is below 80, the applicant would not be accepted, since the average state board for such students in the past (regardless of the intelligence quotient) was 77.5, without a single individual above 79.

In utilizing these results, it is recommended that the limitations already mentioned be considered, along with the needs for people in the field. In some cases, it might be good to train 100 candidates if it is known that only one or two will succeed---if the demand is great enough. Caution should be used in applying these standards too strictly in individual cases, where additional information is available---it can be readily seen that some of the individuals that would have been excluded by these standards, did succeed. In the third category above, for example, 37% of the individuals in the 80-84 high school grade category and with I.Q. below 110, did make state boards above 80. The probability is strongly against such individuals, however, and unless other information is available, such a student would be a poor risk.

Part II. Investigation of relationship between success in Nursing School and on State Board Exam

In investigating the relationship between Nursing School success and State Board success, coefficients of correlation were computed between each of results available indicating success in Nursing School and the State Board Grade. Results of such correlations are as follows:

1. Pre-P and State Board, .32
2. End of 1st year average (Basic Sciences) and State Board, .24
3. 4 year average and State Board, .416

It would appear at first that there is surprisingly low relationship between success in Nursing School and success on the State Board Examination. This is particularly noticeable when noting that the relationship between the high school average and the state board was .67--considerably higher than the 4 year college average and the State Board.

These results can probably be partially explained in terms of the overly homogeneous grading at the Nursing School. Slightly more than 97% of all grades in the Nursing School fall between 80 and 92. Since a coefficient of correlation is affected by the variability of the group, this factor alone is sufficient to lower the coefficient of correlation. In the case of the High School average, 3 times as many scores were outside the 80-92 range as in the case of the college range.

Even considering the correlation to be lower than it should due to the homogeneous grading at the Nursing School, the correlation is lower than would be expected. A number of reasons could be the cause, including the following:

1. The limitations of the measures as mentioned in the limitation. The averages, the State Board, etc. may not be comparable from one year to another due to changes in instructors (and grading standards), State Board Examinations, etc.

2. The State Board Examination may not be a valid measure of nursing proficiency, while the Nursing School does teach suitable material.

3. The State Board Examination may be a valid measure of nursing proficiency, while the Nursing School does not teach suitable material.

It is recommended that further investigation be initiated to determine which of these possibilities is more likely.